

WHAT IS CLAIMED IS:

1. A low resistance fuse comprising:
  - a polymer membrane;
  - a fuse element layer formed on said polymer membrane; and
  - first and second intermediate insulation layers extending on opposite sides of said fuse element layer and coupled thereto, at least one of said first and second intermediate insulation layers comprising an opening therethrough, said polymer membrane supporting said fuse element layer in said opening.
2. A low resistance fuse in accordance with claim 1 wherein said polymer membrane comprises a polyimide film.
3. A low resistance fuse in accordance with claim 1 wherein said polymer membrane comprises a liquid crystal polymer.
4. A low resistance fuse in accordance with claim 1 wherein said low resistance fuse has a thickness of about 0.0005 inches or less.
5. A low resistance fuse in accordance with claim 1 further comprising an arc quenching media in said opening, said arc quenching media surrounding a portion of said fuse element layer within said opening.
6. A low resistance fuse in accordance with claim 1 wherein said fuse element layer comprises a thin film foil.
7. A low resistance fuse in accordance with claim 6 wherein said fuse element layer has a thickness between about 1 to about 20 microns.
8. A low resistance fuse in accordance with claim 6 wherein said fuse element layer has a thickness between about 3 to about 9 microns.

9. A low resistance fuse in accordance with claim 1 wherein said fuse element layer comprises first and second contact pads and at least one fusible link extending therebetween.

10. A low resistance fuse in accordance with claim 9 further comprising at least one heater element connected in series to said fusible link.

11. A low resistance fuse in accordance with claim 1 further comprising a heat sink located proximate said fuse element layer.

12. A low resistance fuse in accordance with claim 1 further comprising first and second outer insulation layers laminated to respective said first and second intermediate insulating layers.

13. A low resistance fuse in accordance with claim 12 wherein at least one of said first and second outer insulating layers and at least one of said first and second intermediate insulating layers comprise a liquid crystal polymer.

14. A low resistance fuse in accordance with claim 12 wherein at least one of said first and second outer insulating layers and at least one of said first and second intermediate insulating layers comprise a polyimide material.

15. A method of fabricating a low resistance fuse, said method comprising:

providing a first intermediate insulating layer;

forming a fuse element layer having a fusible link extending between first and second contact pads; and

adhesively laminating a second intermediate insulation layer to the first intermediate insulating layer over the fuse element layer.

16. A method in accordance with claim 15 wherein said adhesively laminating comprises laminating a polyimide adhesive film.

17. A method in accordance with claim 15 wherein said adhesively laminating comprises applying a liquid polyimide adhesive to one of said insulating layers.

18. A method in accordance with claim 15 wherein said adhesively laminating comprises applying a silicon adhesive to one of said insulating layers.

19. A method in accordance with claim 15 wherein said adhesively laminating comprises encapsulating the fuse element layer with an adhesive element.

20. A method in accordance with claim 15 further comprising the steps of:

providing a polymer membrane;

metallizing the polymer membrane to form the fuse element layer;

forming a fusible link extending between first and second contact pads from the fuse element layer; and

coupling said polymer membrane to said first intermediate insulating layer.

21. A method in accordance with claim 20 further comprising forming an opening in the insulating layer and supporting the fusible link within the opening with the polymer membrane.

22. A method in accordance with claim 21 further comprising laminating the polymer membrane to a polyimide material.

23. A method in accordance with claim 15 further comprising masking one of the first and second intermediate insulating layers, and etching an opening therein.

24. A method in accordance with claim 23 further comprising removing the mask.

25. A method in accordance with claim 15 wherein said metallizing comprises metalizing to a thickness between about 1 to about 20 microns.

26. A low resistance fuse comprising:

a thin foil fuse element layer;

first and second intermediate insulation layers extending on opposite sides of said fuse element layer and coupled thereto, said fuse element layer formed on said first intermediate insulation layer and said second insulation layer laminated to said fuse element layer, wherein at least one of said first and second intermediate insulation layers comprises an opening therethrough; and

an arc quenching media located within said opening and surrounding said fuse element layer within said opening.

27. A low resistance fuse in accordance with claim 26 wherein said fuse element layer has a thickness between about 1 to about 20 microns.

28. A low resistance fuse in accordance with claim 26 wherein at least one of said first and second intermediate insulation layers comprises a polyimide material.

29. A low resistance fuse in accordance with claim 26 wherein at least one of said first and second intermediate insulation layers comprises a liquid crystal polymer.

30. A low resistance fuse in accordance with claim 26 further comprising a heat sink proximate said fuse element layer.

31. A low resistance fuse in accordance with claim 26 further comprising at least one heater element in series with said fuse element layer.

32. A low resistance fuse comprising:

a thin foil fuse element layer;

first and second intermediate insulation layers extending on opposite sides of said fuse element layer and coupled thereto, said fuse element layer formed on said first intermediate insulation layer and said second insulation layer laminated to said fuse element layer, wherein at least one of said first and second intermediate insulation layers comprises an opening therethrough; and

a heat sink coupled to one of said first and second intermediate insulating layers.

33. A low resistance fuse in accordance with claim 32 wherein said thin foil fuse element layer has a thickness between about 1 to about 20 microns.

34. A low resistance fuse in accordance with claim 32 further comprising an arc quenching media located within said opening and surrounding said fuse element layer within said opening.

35. A low resistance fuse comprising:

a thin foil fuse element layer;

first and second intermediate insulation layers extending on opposite sides of said fuse element layer and coupled thereto, said fuse element layer formed to include a fusible link, said first intermediate insulation layer and said second insulation layer laminated on opposite sides of said fuse element layer; and

at least one heater element in series with said fusible link on said fuse element layer.

36. A low resistance fuse in accordance with claim 32 wherein said thin foil fuse element layer has a thickness between about 1 to about 20 microns.

37. A low resistance fuse comprising:

a thin foil fuse element layer;

first and second intermediate insulation layers extending on opposite sides of said fuse element layer and coupled thereto, said fuse element layer formed on said first intermediate insulation layer and said second insulation layer laminated to said fuse element layer, wherein at least one of said first and second intermediate insulation layers comprises an opening therethrough;

first and second outer insulation layers laminated to said first and second intermediate insulation layers, wherein said fuse element layer and said opening are configured to model an adiabatic envelope around a portion of said fuse element layer in a vicinity of said opening.

38. A low resistance fuse in accordance with claim 37 wherein said thin foil fuse element layer has a thickness between about 1 to about 20 microns.